NHANES 2001–2002 Data Release
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Documentation for Laboratory Results

Laboratory 13AM – Triglycerides and LDL-Cholesterol

(1) Documentation File Date – June 6, 2005

(2) Documentation File Name – Laboratory 13AM – Triglycerides and LDL-Cholesterol

(3) Survey Years Included in this File Release – 2001–2002

(4) Component Description

The goals of this component are: 1) to monitor the prevalence and trends in major cardiovascular conditions and risk factors in the U.S.; and 2) to evaluate prevention and treatment programs targeting cardiovascular disease in the U.S.

The main element of the cardiovascular disease laboratory component in NHANES is blood lipid levels. Cardiovascular disease is the leading cause of death in the United States. An estimated 4.8 million Americans have congestive heart failure. Increasing prevalence, hospitalizations, and deaths have made congestive heart failure a major chronic condition in the United States. The data will be used to monitor the status of hyperlipidemia and the success of the National Cholesterol Education Program.

(5) Sample Description:

5.1 Eligible Sample

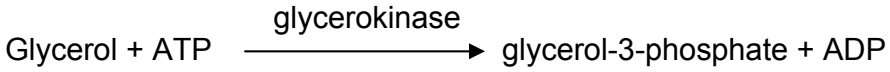
Participants aged 3 years and older who were examined in the morning session were tested. Fasting weights are available for sample persons ages 12 years and above who were fasting at least 8 hours or more but less than 24 hours. Morning (non-fasting) weights are also provided for participants ages 3–11.

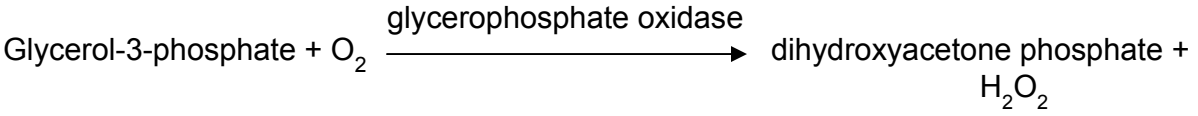
(6) Description of the Laboratory Methodology

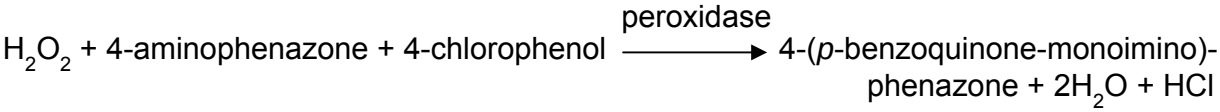
6.1 Triglycerides

Triglycerides are measured enzymatically in serum or plasma using a series of coupled reactions in which triglycerides are hydrolyzed to produce glycerol. Glycerol is then oxidized using glycerol oxidase, and H_2O_2, one of the reaction products, is converted via peroxidase to a phenazone. Absorbance is measured at 500 nm. The reaction sequence is as follows:

$$\text{Triglycerides} + 3H_2O \xrightarrow{\text{lipase}} \text{glycerol} + \text{fatty acids}$$







High levels of serum triglycerides help determine the risk for coronary heart disease (CHD) and peripheral atherosclerosis. High triglycerides are associated with increased risk for coronary artery disease (CAD) in patients with other risk factors, such as low high-density lipoproteins (HDL)-cholesterol, some patient groups with elevated apolipoprotein B, and patients with forms of low-density lipoproteins (LDL) that may be particularly atherogenic. Desirable fasting triglyceride levels are considered to be those below 150 mg/dL and are further categorized as Borderline High, 150–199 mg/dL; High, 200–499 mg/dL; and Very High, > 500 mg/dL. Very high triglycerides can result in pancreatitis. Triglycerides are also measured because the value is used to calculate LDL-cholesterol concentrations. In NHANES, triglycerides are only measured in specimens from the morning session. Sample persons ages 12 and above and fasting at least 8 hours or more but less than 24 hours have values and have non-zero fasting sample weights. Morning (non-fasting) weights are provided for participants ages 3–11 years.

6.2 LDL-Cholesterol

Most of the circulating cholesterol is found in three major lipoprotein fractions: Very low-density lipoproteins (VLDL), LDL, and HDL. LDL-cholesterol is calculated from measured values of total cholesterol, triglycerides, and HDL-cholesterol according to the Friedewald calculation:

$$[\text{LDL-cholesterol}] = [\text{total cholesterol}] - [\text{HDL-cholesterol}] - [\text{triglycerides}/5]$$

where [triglycerides/5] is an estimate of VLDL-cholesterol and all values are expressed in mg/dL. The calculation is valid for triglycerides less than 400 mg/dL.

LDL carries most of the circulating cholesterol and, when elevated, contributes to the development of coronary atherosclerosis. LDL-cholesterol is measured to assess risk for CHD and to follow the progress of patients being treated to lower LDL-cholesterol concentrations. Desirable levels of LDL-cholesterol are below 130 mg/dL, borderline high is from 130–159 mg/dL, high is 160–189 mg/dL and very high LDL-cholesterol is greater than or equal to 190 mg/dL. LDL-cholesterol is reported only for fasting (at least 8 hours or more but less than 24 hours) participants ages 12 and above who were examined in the morning sessions.

(7) Laboratory Quality Control and Monitoring

The NHANES quality control and quality assurance protocols (QA/QC) meet the 1988 Clinical Laboratory Improvement Act mandates. Detailed quality control and quality assurance instructions are discussed in the NHANES Laboratory/Medical Technologists Procedures Manual (LPM). Read the LABDOC file for detailed QA/QC protocols.

(8) Data Processing and Editing

Blood specimens were processed, stored and shipped to Johns Hopkins Hospital, Baltimore, Maryland for analysis. Detailed specimen collection and processing instructions are discussed in the NHANES LPM. Read the LABDOC file for detailed data processing and editing protocols. The analytical methods are described in the Description of the Laboratory Methodology section.

(9) Data Access

All data are publicly available.

(10) Analytic Notes for Data Users

10.1 NHANES 2001–2002 laboratory data

The analysis of NHANES 2001–2002 laboratory data must be conducted with the key survey design and basic demographic variables. The NHANES 2001–2002 Household Questionnaire Data Files contain demographic data, health indicators, and other related information collected during household interviews. They also contain all survey design variables and sample weights for these age groups. The phlebotomy file includes auxiliary information such as the conditions precluding venipuncture. The household questionnaire and phlebotomy files may be linked to the laboratory data file using the unique survey participant identifier SEQN.

10.2 LBXTR

Serum triglyceride levels were measured on examinees that were examined in the morning session only. The distribution of serum triglycerides should be estimated only on examinees ages 12 and above who fasted at least 8 hours or more but less than 24 hours, were examined in the morning, and were randomly assigned to the morning fasting sample.

The Laboratory 13AM data file contains laboratory test results for triglycerides (LBXTR), which uses the reference analytic method. However, the NHANES Lab 40 biochemistry profiles also include measurements of triglycerides (Lab 40 variable name is LBXSTR). The appropriate variable to use is LBXTR from Lab 13AM.

10.3 LBDTRSI

The triglycerides in mg/dL (LBXTR) was converted to mmol/L (LBDTRSI) by multiplying by 0.01129.

10.4 LBDLDL

Serum LDL-cholesterol levels were measured on examinees that were examined in the morning session only. The distribution of serum LDL-cholesterol should be estimated only on examinees ages 12 and above who fasted at least 8 hours or more but less than 24 hours, were examined in the morning, and were randomly assigned to the morning fasting sample. LDL-cholesterol is calculated from measured values of total cholesterol, triglycerides, and HDL-cholesterol according to the Friedewald calculation:

[LDL-cholesterol] = [total cholesterol] – [HDL-cholesterol] – [triglycerides/5]

where all values are expressed in mg/dL. The calculation is valid for triglycerides less than 400 mg/dL.

10.5 LBDLDLSI

The LDL-cholesterol in mg/dL (LBDLDL) was converted to mmol/L (LBDLDLSI) by multiplying by 0.02586.

10.6 Sampling Weights: WTSAF4YR and WTSAF2YR

The analyst is strongly encouraged to use the 4-year MEC-examined weights (WTSAF4YR) to analyze 1999–2002 triglycerides and LDL-cholesterol. Fasting weights were generated for Laboratory 10AM (diabetes laboratory tests) and are also used for Laboratory 13AM, because multiple fasting weights were not desirable. Non-zero fasting weights were generated for sample persons 12 years and older, who fasted at least 8 hours or more but less than 24 hours, and were examined in the morning session. In addition, these sample persons were never told by a healthcare provider that they had diabetes (DIQ010 ≠ 1) and had non-missing glucose values or the healthcare provider said they had diabetes (DIQ010 = 1). The 2-year weights (WTSAF2YR) should be used when analyzing NHANES 2001–2002. Morning weights are also available for non-fasting participants ages 3–11 years in these weight files.

See Analytic Guidelines (at http://www.cdc.gov/nchs/data/nhanes/nhanes_general_guidelines_june_04.pdf).

(11) References

N/A